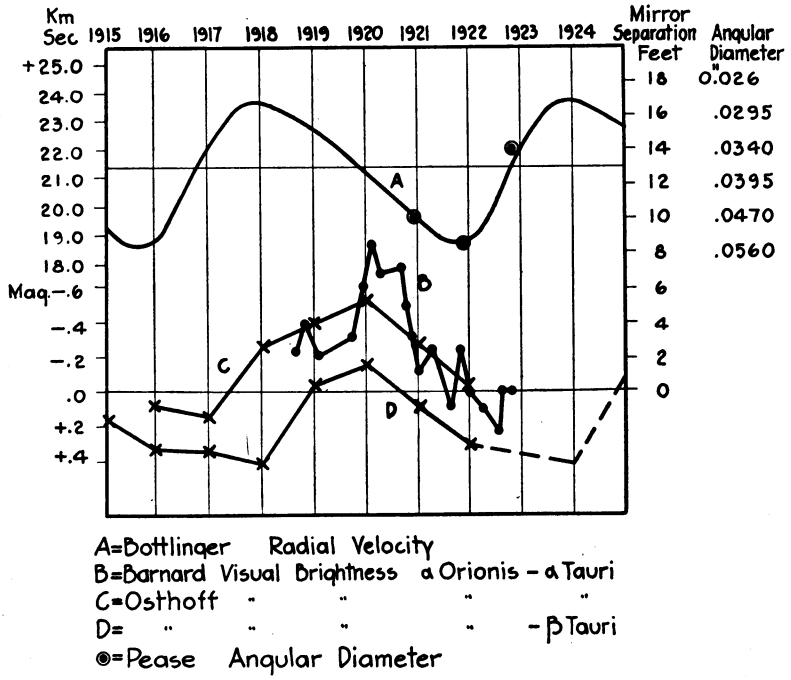
NOTES ON STAR DIAMETERS:
I. POSSIBLE VARIATIONS IN THE DIAMETER OF α ORIONIS

Further measures have been made on α *Orionis* with the 20-foot interferometer attached to the 100-inch reflector, with the beam extending east and west. On the nights of October 14 and 15, 1922, the visibility curve was found to cross the axis at 14 feet, corresponding to an angular diameter of 0″.034. On the first night the seeing was excellent; on the second night it



was poor, but there were enough moments of good seeing to obtain an excellent curve. The readings for minimum diameter last year were 8½ feet, equivalent to a diameter of 0″.054. These measures were made in September and November, 1921, and the seeing was the same as on October 15 of this year. For the year 1920, we have the measures made in December with good seeing, giving a disappearance of the fringes at ten feet,

equivalent to an angular diameter of 0″.047. It is believed these measures are not more than ten per cent in error.

Two suggestions are offered to explain these different results: First, the seeing "background" may be better this year than in the two previous years. This does not seem to be upheld by readings made on the zero images and on other stars. The ordinary seeing was, in general, poor throughout the year, but there were times of good interferometer seeing which were not far different from those of this year. Second, there may be some variation in the effective diameter of the star itself. It is well known that *α Orionis* varies in brightness, and on the accompanying chart I have shown a rough curve of Osthoff's measures[1] of its visual brightness compared with *β Orionis* and *α Tauri*. Professor Barnard has generously placed at my disposal his unpublished naked-eye comparisons of *α Orionis* with *α Tauri*, and upon plotting these we find the curve not to differ greatly from Osthoff's. I have also inserted Lunt's plotting of Bottlinger's radial velocity curve,[2] extending it for a period of 12 years. Plotting the dates of interferometer observations of minimum diameter upon the radial velocity curve, we have found that the ordinates of the curve are roughly proportional to the mirror separations. Lunt believes that Bottlinger's curve needs to be corrected and that the maximum and minimum occur earlier than shown. From the present data it appears that some relationship may exist between radial velocity, visual brightness and angular diameter, the phase relation as yet being uncertain. Additional interferometer measurements are necessary to determine whether this connection is real or accidental. The diameters given are calculated from the formula for a uniform disk, $\alpha = 1.22\lambda/d$. It is not at all certain that the factor 1.22 should be used throughout. It would aid greatly in solving the problem to have further precise observations of the visual magnitude, bolometric intensity, and radial velocity, and also to note particularly whether there may not be extremely small changes in type of spectrum.

FRANCIS G. PEASE

Mount Wilson Observatory, November 6, 1922.

[1] *Die Veranderlichkeit von α Orionis*, Von H. Osthoff. *A. N.* 5172, 187.

[2] On the Orbits of the Spectroscopic Binaries *α Orionis* and *α Scorpii*. Joseph Lunt, *Astroph. Jour.*, **44**, 250, 1916.